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Investigation Title: Utilization of Skylab (EREP) System
for Appraising Changes in Continental
Migratory Bird Habitat.

EREP Investigation No. 486
Period Covered: February 1975
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Type of Report: Monthly Progress

Overall Status:

A major task undertaken during this reporting period was the evaluation of various near-infrared bands for the purpose of discriminating open surface water and an investigation of spatial registration between S-192 SDO's.

We encountered some difficulty in separating open water from bare soil using near-infrared channels in the shorter wavelengths. Water usually appears darker than soils in these wavebands, but occasionally a bare soil pixel was dark enough to be classified as water. The slight overlap of reflectance levels of water and soil was probably due to the low sun angle during data collection and the consequent lack of sufficient radiation to adequately illuminate non-water features. We selected the 1.55- to 1.75- μ m spectral band as the most useful for single channel water discrimination because in this band soils were consistently lighter than water. Subsequent reports will quantify these findings.

In analyzing the accuracy of spatial registration between SDO's, density level maps of a large, deep lake were generated for all bands in the wavelength interval 0.68- to 1.75- μ m. These included SDO's 7, 8, 9, 10, 11, 12, 17, 19, and 20. Because these were all near-infrared SDO's, an abrupt boundary between water and non-water pixels was present. Furthermore, if

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spatial registration between SDO's was perfect, the location of this boundary should have been similar for each SDO; however, an analysis for registration tended to create two groupings of SDO's. They were:

| <u>Group A</u> | <u>Group B</u> |
|----------------|----------------|
| SDO 7 | SDO 17 |
| 8 | 19 |
| 9 | 20 |
| 10 | |
| 11 | |
| 12 | |

Between groups, it appeared that a shift by one pixel in each scan line (straightened) would have been sufficient to bring the data into more reasonable registration. We wish to point out, however, that within either group, registration between SDO's was still not perfect. For example, a comparison, within group, of any two SDO's indicated that between 30 and 50 percent of the lake's peripheral pixels were randomly out of register. This situation poses special problems for any multi-spectral recognition analysis and especially for our anticipated proportion estimation processing. Proportion estimation (mixtures processing) is a method which utilizes the added information content of multispectral data to estimate the mixture or fractions of pure scene materials which may be present within a data pixel. Utilizing this procedure in the case of surface water mapping, it should be possible to discriminate many water features smaller than a pixel in size as well as to improve the edge definition of the larger ponds and lakes.

Recommendations for Action:

The special problems described above were not originally anticipated in the program's analysis effort. Because of the additional workload our progress is behind schedule. We, therefore, recommend that the investigation completion date be extended approximately 90 days in order to compensate for the unscheduled delay in data analysis and to permit us to investigate this apparent defect in data collection/preparation. Minimum additional funding may be required.

Expected Accomplishments During the Next Reporting Period:

Surface water thematic maps and associated statistics will be generated from S-192 data. Comparisons of S-192 data will be made with ERTS-1 data collected about the same time period.

Significant Results:

None to report.

Summary Outlook:

We are now in the major processing and analysis effort of this program.

During the next month mapping of open surface water using a single channel, near-infrared discrimination technique will be accomplished. Subsequent work will involve multispectral data analysis.

Travel Summary and Outlook:

No travel was undertaken during the previous reporting period. Travel is not contemplated during the next reporting period.

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